

Install Pumpjacks on Low Water Production Gas Wells



Partner Reported Opportunities (PROs)
for Reducing Methane Emissions

PRO Fact Sheet No. 707

Applicable sector(s):

☒ Production ☐ Processing ☐ Transmission and Distribution

Partners reporting this PRO: ConocoPhillips

Other related PROs: Install Plunger Lift Systems in Gas Wells, Use Foaming Agents, Install Velocity Tubing Strings, Gas Well Unloading Time Optimization

Compressors/Engines ☐
Dehydrators ☐
Pipelines ☐
Pneumatics/Controls ☐
Tanks ☐
Valves ☐
Wells ☒
Other ☐

Technology/Practice Overview

Description

Gas wells load up and cease to flow when their tubing velocity is insufficient to flow produced liquids to the surface. Options available to the producer are to shut in the well to allow bottom-hole pressure to increase, blowdown the well to the atmosphere, or install some type of artificial lift system.

The installation of a pumpjack (a positive displacement, down-hole pump stroked with sucker rods) is a type of artificial lift that can be used by industry to remove liquids (usually formation water) from low water producing low-pressure gas wells. Pumpjacks can be used when there is an insufficient buildup in reservoir pressure to operate a plunger lift system. The pumpjacks can be either manually started and stopped as needed by the field pumper or operated with a timer. One partner has extended the life of its low-pressure gas wells, increased ultimate recoveries and eliminated atmospheric emissions from blowdowns by installing pumpjacks on 45 wells.

Surface flowing tubing pressure and production will decline as the low-pressure gas wells load-up with water and eventually cease to produce. The pumpjacks not only extend the well's producing life but also eliminate the need for operators to manually vent water and gas to the atmosphere for up to one hour per well per day.

Operating Requirements

A pumpjack and a well workover rig are required to optimize flow and reduce methane emissions on each well. Field personnel must be trained in the proper maintenance of the units. Contract crews are typically used to work on the units and for down-hole work.

Applicability

The installation of pumpjacks is applicable to low-pressure gas wells that produce some associated liquids and are subject to loading up.

Methane Savings: 43,780 Mcf per year for 45 wells or 973 Mcf/yr/well

Costs

Capital Costs (including installation) per Well

☐ <\$1,000 ☐ \$1,000 – \$10,000 ☒ >\$10,000

Operating and Maintenance Costs (annual) per Well

☐ <\$100 ☐ \$100-\$1,000 ☒ >\$1,000 – \$10,000

Payback (Years)

☐ 0–1 ☐ 1–3 ☐ 3–10 ☒ >10

Benefits

Increased profits through the sale of previously vented gas volumes and extended well life are the primary benefits of installing pumpjacks on low-pressure gas wells. Increased recoverable reserves are an added benefit for wells equipped with pumpjacks. Reduced methane emissions are an associated benefit.

Methane Emissions Reductions

Methane is vented to the atmosphere during liquid blowdown operations to restore a gas well to production. A partner reduced blowdown emissions 43,780 Mcf per year by installing pumpjacks on 45 wells.

Economic Analysis

Basis for Costs and Savings

Additional income per well of \$2,900 per year based on a reduction in vented emissions of 973 Mcf of gas with a nominal value of \$3.00 per Mcf was realized.

Discussion

Payout is in 15 to 22 years. Capital costs will include the use of a workover rig and crew, for approximately 1 to 2 days, sucker rod and pump costs, and the cost of the pumpjack. Location preparation, down-hole equipment, and pumpjack can be installed for approximately \$62,000 per well (includes average cost of \$17,000 per pumpjack). Although methane reductions are not large, the added benefits of extended well life and increased gas reserves make it worthwhile. Some companies have surplus units in stock that can be used at no additional expense.

Field personnel must be familiar or trained in pumpjack operations. Field operation and maintenance costs through additional fuel consumption, down-hole pump replacement, and rod and tubing failures will increase. The cost and time are justified by increased profits, extended well life (gas reserves), and reduced emissions, plus the salvage value of the unit and down-hole equipment at the end of the life of the well.

Installing pumpjacks with electric motors, rather than natural gas-fueled engines, can further reduce atmospheric methane emissions. This reduces fuel requirements by around 1,500 Mcf per yr per unit. Approximately 0.5 percent of the fuel is emitted as unburned methane (8 Mcf per yr).